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Art Unit 2856

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

Applicants: Burt Swersey, et al  
Serial No: 09/800,872  
Filed: March 7, 2001  
TITLE: DIFFERENTIAL PERMEOMETER Customer No.: 27162

Commissioner for Patents  
Washington, D.C. 20231

**AMENDMENT**

Sir:

In response to the Office Action dated April 20, 2004, please amend the application as follows:

**In the Title**

Change "Differential Permeometer" to -- Differential Permeameter--

In the Description:

Page 1, lines 4- 6, cancel "This....sample." and substitute therefor:

--This invention relates to a differential ~~permeometer~~ permeameter. More particularly, this invention relates to a differential ~~permeometer~~ permeameter for the measurement of fluid permeability through a porous, sheet-like sample.—

Page 4, lines 11-18, cancel "A ...results." and substitute therefor:

-- A ~~permeometer~~ permeameter sold by Frazier, Inc. [of Hagerstown, MD] benchmarks the series method. The device draws a variable suction across the permeable membrane and a fixed but alterable orifice. Pressure drop across the porous sheet-like material is held to a standard, while the pressure drop across the fixed orifice is measured and compared with calibrated results. Once again, problems arise with changes in atmosphere. Changes in temperature, pressure, humidity, et cetera, between the conditions at calibration and the conditions at measurement will cause error in results. —

Page 7, line 13, cancel, "The... of:" and substitute therefor:

--The invention provides a ~~permeometer~~ permeameter, which is comprised of:--

Page 9, lines 13 to 17, cancel "Fig.1...Fig.1;" and substitute therefor:

--Fig. 1 is a simplified schematic illustration of a ~~permeometer~~ permeameter constructed in accordance with the invention;

Fig. 2 is an isometric sketch of the ~~permeometer~~ permeameter of Fig. 1;

Fig.3 illustrates a side view of a clamping device employed in the ~~permeometer~~ permeameter of Fig. 1;--

Page 10, line 15 to page 11, line 2, cancel "Referring...circular." and substitute therefor:

--Referring to Fig 1, the ~~permeometer~~ permeometer includes a test fluid flow system 10 and a reference fluid flow system 12 which are in the form of tubes and are in common communication with a reservoir system 16. Fluid flow is initiated by a fluid flow initiator 18, for example, a speed-controlled centrifugal fan. The applied fluid used in this embodiment of the apparatus is air. The cross section of each of the test fluid flow system 10, the reference fluid flow system 12 and the reservoir system 16 is circular.--

Page 12, lines 1 to 7, cancel " Referring ...hole." and substitute therefor:

-- Referring to Figs. 6 and 7, a change in orifice diameter is often needed to ensure that the pressure measurements stay within the operational range of the pressure gauges or required standard measurement range. Continuous variation in orifice size is accomplished by sliding an orifice plate 67a, 67b over the plate 20a, 20b using a dual motorized screw drive 64 that is mounted on a bracket 68 in the space between the flow systems 10,12. The sliding action changes the total area of each orifice hole.--

lines 8 to 17, cancel "In...measured." and substitute therefor:

--In order to use the ~~permeometer~~ permeameter, a sheet-like test sample 26 is required. A sheet-like reference sample 28 is also required for percent difference in permeability measurement. The reference sample should have a known permeability or have known desirable characteristics. Samples 26 and 28 can also be similar, yet both unknown, in which case exact percent change in permeability will be measured as a quantified quality/ consistency indication. If absolute permeability is the desired measurement, the reference sample 28 should be omitted. The differential pressure difference will read the absolute pressure drop across the test sample 26, and the absolute permeability can be measured.--

Page 15, lines 11 to 20, cancel "The ...water." and substitute therefor:

--The method of operation of the ~~permeometer~~ permeameter is completed with the use of four pressure transducers mounted in a common housing 30 (see Fig. 2). After the test sample 26 and reference sample 28 are manually placed in the corresponding clamping devices such as those described by 40, 42 or 44, the speed of the fluid flow initiator 18 is manually or automatically adjusted by a computer or other data/control system 32, so that the pressure drop across the reference sample is 0.5 inches of water, measured using pressure transducer PT1. The flow is similar through both the test fluid flow system 10 and the reference fluid flow system 12, and therefore the pressure drop across test sample 26 is similar to 0.5 inches of water.—

Page 18, lines 8 to 16, cancel," The ...water." and substitute therefor;

--The method for operation of the Pitot tube ~~permeometer~~ permeameter is completed with the use of three pressure transducers. After the test sample 26 and reference sample 28 are manually placed in the corresponding clamping devices, the speed of the fluid flow initiator 18 is manually or automatically adjusted so the pressure drop across the reference sample and the atmosphere is 0.5 inches of water, measured using pressure transducer PT1. The airflow is similar through both the test fluid flow system 10 and the reference fluid flow system 12, therefore the pressure drop across test sample 26 is similar to 0.5 inches of water.—

Page 19, line 19 to page 20, line 7, cancel " Beyond...reservoir." and substitute therefor:

--Beyond simple air permeability testing, the differential ~~permeometer~~ permeameter allows accurate testing with almost any fluid flow, assuming the relative viscosity is low enough. To perform low-viscosity fluid permeability tests, minor device modifications should be considered. While background theories hold for most low viscosity fluids, certain special

conditions may apply to fluids that are denser than air. In order to maintain even distribution, the flow systems 10,12 may need to remain in a vertical position to maintain evenly distributed laminar flow (to prevent pooling in areas of the machine) though with most fluids this is unnecessary after proper pressure is generated by the pumping device. In addition, in low viscosity, lower-density fluids such as water; the test fluid can be recycled via a reservoir.—

Page 20, lines 8 to 23, cancel "All...values." and substitute therefor:

--All of the ~~permeometer~~ permeameter parts should be appropriate for (non-air) fluid testing, for example, the pressure sensors should be approved for other fluid testing and the pressure fan should be replaced with a variable speed fluid pump. Further special considerations should be taken when working with fluids that are potentially damaging to the apparatus (for example acidic and basic fluids) and appropriate care and or replacements should be practiced.

The fluid immersion differential permeability testing allows for the examination and testing of a variety of materials beyond the capabilities of air permeability, such as soil samples, wet filters, permeability to different fluids (e.g. N2 or O2), and the like.

The operation of a fluid ~~permeometer~~ permeameter should be identical to the operation of the standard construction of the ~~permeometer~~ permeameter. The minor operational changes primarily govern fluid flow, specifically maintaining the level of feed fluid either from a recycling reservoir or from a reserve source. In addition, the pressure of the fluid against the flow surface of the samples (external to testing tubes) should be maintained constant to prevent erroneous differential permeability values.—

Page 22, lines 8 to 12, cancel "The ...samples." and substitute therefor:

--The invention thus provides a ~~permeometer~~ permeameter and method wherein environmental factors are eliminated in the testing of a sheet-like permeable membrane sample by either providing a known sheet-like permeable membrane reference sample to provide an accurate permeability measurement or measuring the percent change between test and reference samples.—

Page 23, lines 4 to 6, cancel "The ...plenums." and substitute therefor:

--The ~~permeometer~~ permeameter may be operated to maintain a pressure differential applied to gauges within their operational limits while increasing the distance between testing tubes by manipulating air flow transmission pipes and plenums.—